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CTS Collaborative Transplant Study

Manual No.	19
Revision	July 21, 2025
Product No.	119
Lot No.	DQB14-2

WORKING INSTRUCTION

HLA-DQB1*low resolution CTS-PCR-SSP TRAY KIT

LOCUS- AND LOT-SPECIFIC MANUAL

To be applied to the following product:

Product No.	Description
119	HLA-DQB1* low resolution CTS-PCR-SSP Tray Kit  

1. Main differences

- **Between Lot DQB14-2 (the current lot) and Lot DQB14-1:**
The kit was updated to cover new alleles included in the IMGT/HLA Database of January 2025. Deleted and renamed alleles were taken into consideration.

2. Introduction

- **Intended use:** This kit provides reagents for low/ intermediate resolution HLA-DQB1 typing using the PCR-SSP method. All serologically detectable HLA-DQ antigens as well as their serological splits can be assigned. In addition, some of the DNA-specificities which cannot be identified by serology can be detected by the kit.
 - Allele coverage: IMGT/HLA Sequence Database Release 3.59.0, January 2025, **except** HLA-DQB1*02:25/02:35/02:40/02:72/02:147, DQB1*04:02:02/04:02:08/04:02:22/04:02:23/04:31/04:48, DQB1*05:01:14/05:03:10/05:21/05:60/05:72-05:73/05:82/05:98/05:105/05:116/05:175/05:207/05:218/05:258/05:300, DQB1*06:09:04/06:22:01/06:22:03/06:69:02/06:153:01-06:153:02/06:167/06:231/06:247/06:260/06:301/06:318/06:332/06:342/06:415/06:417/06:441
These alleles are considered to be rare.
- This manual is only valid for **Lot No. DQB14-2**.
- This manual should be used together with the Main Manual (General Information) which is the 'Working instruction for the CTS-PCR-SSP **TRAY and MINITRAY KITS**' (Manual No. 100A).

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Table 1: Allele specificities and sizes of the products of each HLA-DQB1* CTS-PCR-SSP primer mix (Lot No. DQB14-2) based on IMGT/HLA Sequence Database Release 3.59.0, January 2025	5
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Table 2: Amplification patterns for all HLA-DQB1* alleles detected by the HLA-DQB1* CTS-PCR-SSP reagents (Lot-No DQB14-2) based on IMGT/HLA Sequence Database Release 3.59.0, January 2025	15
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4. Kit Composition

- Number of PCR primer mixes per test: 14:
 - 13 HLA-specific mixes
 - 1 negative control mix
- Please note: Wells (positions on tray) B2-A2, B4-A4, B6-A6, B8-A8, B10-A10 and B12-A12 are empty.
- Number of tests per tray: 6
- Number of trays per kit: 10
- The primer mixes are aliquoted and lyophilized in PCR-Trays.
- PCR buffer: 3.0 ml of Mastermix SSP (without Taq polymerase)

For storage condition, please refer to Section 1 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

5. Materials, Reagents and Equipment not supplied

Please refer to Section 2 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

6. Sample Requirements, PCR and Gel Electrophoresis

Please refer to Section 3 to 6 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

7. Result Evaluation

- Check the approximate size of the PCR product against the Primer Mix Specificity Table (Appendix / Table 1) to confirm the correct product size.
- Use the Amplification Pattern Table (Appendix / Table 2) to make the allele assignments or use the SCORE Software for detailed result interpretation.

8. Interpretation Hints

- Weak or false positive reactions can occur if you use a different Taq polymerase. Also the quality and quantity of DNA is a crucial factor and can affect the mix reactivities.
- Alleles that are known to amplify weakly are listed with "w" (= weak) in the tables (Appendix). Under suboptimal test conditions, some mixes of this lot are particularly prone to give false positive reactions and are indicated in Section 9.
- Please refer to Section 7 and 8 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

9. Special notes

- Differentiation of HLA-DQB1*03 serological equivalents: Mix 6 and 7 mainly detect HLA-DQB1*03 alleles which belong to the serological group of HLA-DQ7(3). Mix 8 and 9 react positively with HLA-DQB1*03 alleles of the HLA-DQ8(3) serological group, whereas mix 10 and 11 amplify HLA-DQB1*03 alleles which can serologically be defined as HLA-DQ9(3). Some other less common alleles are amplified by these mixes in addition.
Mix 12: The majority of HLA-DQB1 alleles amplified by mix 12 result in two PCR fragments (110/160 bp), except HLA-DQB1*03:05 and some rare alleles that generate only one PCR fragment (110 bp).
- Some mixes contain specific primers which may give rise to PCR fragments of **two** different sizes simultaneously (see Table 1).
- Potentially false positive reactions: Mixes **9** and **11**.
- Amplification control can be weak: Mix **9**.

10. Troubleshooting

Please refer to Section 8 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

11. Precaution

Please refer to Material Safety Data Sheet for the CTS-PCR-SSP TRAY and MINITRAY KITS (Manual No. 100B) supplied along with this product.

12. Contact

If you have any particular questions concerning this kit, which are not answered in this or the Main Manual, please do not hesitate to contact us at:

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13. Appendix

Table 1: Allele specificities and sizes of the products of each **HLA-DQB1*** CTS-PCR-SSP primer mix (**Lot No. DQB14-2**) based on IMGT/HLA Sequence Database Release 3.59.0, January 2025

Position						Mix	Allele	Serology	Size
H1	H3	H5	H7	H9	H11	Mix 1	DQB1*04:10w, DQB1*05:01:01:01-05:01:13/05:01:15/05:01:16w/05:01:17-05:01:18/05:01:19w/05:01:20-05:03:09/05:03:11-05:03:24/05:03:25w/05:03:26-05:20:02/05:22-05:25/05:26w/05:27-05:33/05:34w/05:35-05:43:02/05:44w/05:45-05:59/05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:113w/05:114-05:115/05:117-05:127/05:128Nw/05:129/05:130w/05:131-05:170/05:171w/05:172-05:174/05:176-05:206N/05:208N-05:217/05:219-05:227/05:228w/05:229-05:257/05:259-05:299/05:301/05:302w/05:303-05:343/05:345-05:349/05:350?/05:351-05:357, DQB1*06:23/06:156/06:162/06:169/06:325	-, DQ5(1), Null	see below
							DQB1*04:10w, DQB1*05:03:02/05:43:02/05:301, DQB1*06:23/06:156/06:162/06:169	-, DQ5(1)	135 bp
							DQB1*05:01:01:01-05:01:13/05:01:15/05:01:16w/05:01:17-05:01:18/05:01:19w/05:01:20-05:03:09/05:03:11-05:03:24/05:03:25w/05:03:26-05:20:02/05:22-05:25/05:26w/05:27-05:33/05:34w/05:35-05:43:02/05:44w/05:45-05:59/05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:113w/05:114-05:115/05:117-05:127/05:128Nw/05:129/05:130w/05:131-05:170/05:171w/05:172-05:174/05:176-05:206N/05:208N-05:217/05:219-05:227/05:228w/05:229-05:257/05:259-05:299/05:301/05:302w/05:303-05:343/05:345-05:349/05:350?/05:351-05:357, DQB1*06:325	DQ5(1), -, Null	225 bp

Position						Mix	Allele	Serology	Size
G1	G3	G5	G7	G9	G11	Mix 2	DQB1*03:194/03:408, DQB1*05:344w, DQB1*06:01:01:01-06:01:29/06:01:30?/06:01:31-06:01:36/ 06:02:07/06:03:01:01-06:03:06/06:03:08-06:03:18/06:03:20-06:03:53/06:08:01:01-06:08:03/06:11:02- 06:12/06:14:01/06:14:03/06:17/06:21/06:26N/06:28/06:30-06:31/06:35/06:40-06:45/06:53:01-06:57:02/ 06:59-06:65/06:67/06:82/06:87/06:90-06:92:02/06:98-06:105/06:108/06:110/06:120/06:128/06:132- 06:134/06:140-06:145:02/06:148/06:149w/06:154/06:157/06:165/06:168/06:170/06:177/06:181/06:184- 06:185/06:187/06:190:01-06:191/06:194-06:196/06:199/06:203/06:205/06:209-06:210/06:214/06:218/ 06:221-06:223/06:229-06:230/06:233-06:234/06:238-06:239/06:243-06:246/06:248/06:250-06:251/ 06:253/06:257w/06:258-06:259/06:263/06:268-06:269/06:272/06:274-06:275/06:276w/06:277-06:279/ 06:285/06:302/06:305/06:307/06:309-06:310/06:312/06:316/06:319:01/06:321/06:323/06:327-06:331/ 06:334/06:336/06:340/06:345N-06:346/06:350/06:352/06:359-06:360/06:362/06:365/06:367/06:371/ 06:373/06:378/06:382/06:385/06:391-06:392/06:394N/06:396/06:399?/06:400/06:403/06:410/06:418- 06:419/06:421/06:423N-06:425/06:427-06:428/06:433/06:435/06:440/06:443/06:450/06:453-06:455/ 06:459-06:460/06:462-06:463/06:464?/06:466/06:469-06:472/06:474-06:475/06:478/06:480-06:482/ 06:484/06:488/06:492/06:495/06:500-06:502/06:504/06:507N/06:509-06:510/06:513-06:514/06:516/ 06:518/06:521-06:522/06:525	-, DQ6(1), DQ1, Null	see below
							DQB1*03:408, DQB1*06:01:01:01-06:01:29/06:01:30?/06:01:31-06:01:36/06:35/06:43/06:45/06:53:01- 06:57:02/06:98-06:105/06:108/06:120/06:132/06:140/06:142/06:157/06:168/06:177/06:181/06:194/ 06:205/06:209/06:214/06:229/06:239/06:243/06:245-06:246/06:251/06:257w/06:258/06:263/06:268/ 06:274/06:277/06:285/06:305/06:307/06:309-06:310/06:312/06:321/06:323/06:330N/06:359/06:382/ 06:418-06:419/06:421/06:427/06:435/06:462-06:463/06:464?/06:466/06:469/06:471-06:472/06:475/ 06:482/06:484/06:492/06:501/06:507N/06:509/06:513/06:516	-, DQ6(1), Null	160 bp
							DQB1*03:194, DQB1*05:344w, DQB1*06:02:07/06:03:01:01-06:03:06/06:03:08-06:03:18/06:03:20- 06:03:53/06:08:01:01-06:08:03/06:11:02-06:12/06:14:01/06:14:03/06:17/06:21/06:26N/06:28/06:30- 06:31/06:40-06:42/06:44/06:59-06:65/06:67/06:82/06:87/06:90-06:92:02/06:110/06:128/06:133-06:134/ 06:141/06:143-06:145:02/06:148/06:149w/06:154/06:165/06:170/06:184-06:185/06:187/06:190:01- 06:191/06:195-06:196/06:199/06:203/06:210/06:218/06:221-06:223/06:230/06:233/06:234/06:238/ 06:244/06:248/06:250/06:253/06:259/06:269/06:272/06:275/06:276w/06:278-06:279/06:302/06:316/ 06:319:01/06:327-06:329/06:331/06:334/06:336/06:340/06:345N-06:346/06:350/06:352/06:360/06:362/ 06:365/06:367/06:371/06:373/06:378/06:385/06:391-06:392/06:394N/06:396/06:399?/06:400/06:403/ 06:410/06:423N-06:425/06:428/06:433/06:440/06:443/06:450/06:453-06:455/06:459-06:460/06:470/ 06:474/06:478/06:480-06:481/06:488/06:495/06:500/06:502/06:504/06:510/06:514/06:518/06:521- 06:522/06:525	-, DQ6(1), DQ1, Null	170 bp

Position						Mix	Allele	Serology	Size
F1	F3	F5	F7	F9	F11	Mix 3	DQB1*03:08/03:23:01-03:23:02/03:137/03:217:01/03:228, DQB1*05:43:02, DQB1*06:02:01:01-06:03:03/06:03:05w/06:03:06-06:03:07/06:03:11-06:03:13/06:03:15/06:03:17-06:03:25/06:03:27-06:03:29/06:03:31-06:03:33/06:03:35-06:03:53/06:07:01/06:08:01:01-06:08:01:02/06:10-06:11:03/06:13:01-06:14:02/06:15:01-06:16/06:19:01-06:20/06:23-06:24/06:26N/06:28-06:32:01/06:33/06:37/06:40-06:41:01:03/06:44/06:46-06:50/06:51:02/06:60-06:63/06:65w/06:67-06:68/06:70-06:84:01:02/06:87/06:90/06:92:02/06:95-06:97/06:106-06:107/06:109-06:118:01/06:118:03/06:119/06:122-06:128/06:130-06:131/06:133-06:134/06:136-06:138/06:141/06:143-06:144N/06:146:01-06:148/06:150-06:152/06:154/06:156/06:159/06:161-06:163/06:165-06:166/06:169-06:170/06:173-06:176/06:178-06:179N/06:182-06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:201/06:203/06:206:01-06:206:02/06:208:01-06:208:02/06:210-06:211/06:213/06:215-06:216N/06:218-06:219/06:221-06:228/06:230/06:232-06:238/06:240/06:242/06:244/06:248-06:250/06:253/06:255-06:256/06:262/06:264/06:269-06:273/06:276/06:278-06:279/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:317N/06:319:02/06:322:01-06:322:03/06:324/06:326-06:329/06:333-06:338/06:340-06:341N/06:344-06:347/06:350/06:352/06:354-06:357/06:360/06:362-06:367/06:370/06:372-06:374/06:376/06:378-06:380/06:383N-06:386/06:388-06:397N/06:399-06:406/06:408-06:413/06:416:01:01Q-06:416:01:02Q/06:422N-06:425/06:428/06:430-06:431/06:433/06:436-06:438/06:440/06:442-06:443/06:445-06:448/06:450-06:451/06:453-06:457/06:459-06:461/06:468/06:470/06:474/06:476-06:478/06:480-06:481/06:483/06:485-06:488/06:491N/06:493/06:495/06:497/06:499-06:500/06:502-06:504/06:510/06:512/06:514-06:515/06:517-06:518/06:521-06:522/06:524-06:525	-, DQ6(1), DQ1, Null	see below
							DQB1*03:23:01-03:23:02/03:217:01, DQB1*06:02:01:01-06:02:06/06:02:08-06:02:10/06:02:12-06:02:42/06:02:44-06:02:65/06:03:07/06:11:01:01-06:11:01:02/06:14:02/06:15:01-06:16/06:19:01-06:20/06:24/06:33/06:37/06:46-06:50/06:51:02/06:68/06:70-06:74/06:76-06:81/06:83-06:84:01:02/06:95/06:96:02-06:97/06:107/06:109/06:111-06:117/06:118:03/06:122/06:124/06:127/06:131/06:137-06:138/06:146:01-06:147/06:150/06:152/06:159/06:161/06:163/06:173/06:175-06:176/06:178-06:179N/06:183/06:188/06:192/06:197-06:198/06:200-06:201/06:208:01-06:208:02/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232/06:235-06:237/06:240/06:242/06:249/06:255-06:256/06:262/06:270:01-06:271/06:273/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:315/06:317N/06:322:03/06:324/06:326/06:333/06:335/06:338/06:341N/06:344/06:347/06:354-06:357/06:363-06:364/06:366/06:370/06:372/06:376/06:379N-06:380/06:384/06:386/06:388/06:390/06:395/06:397N/06:401-06:402/06:404-06:406/06:409/06:411-06:413/06:416:01:01Q-06:416:01:02Q/06:422N/06:430-06:431/06:436-06:438/06:442/06:445-06:448/06:451/06:457/06:461/06:468/06:476/06:486-06:487/06:491N/06:497/06:499/06:503/06:512/06:515/06:517	-, DQ6(1), DQ1, Null	130 bp

Position					Mix	Allele	Serology	Size
						DQB1*03:08/03:137/03:228, DQB1*06:02:01:01-06:02:06/06:02:09-06:02:65/06:03:07/06:10-06:11:01:02/ 06:13:01-06:13:03/06:14:02/06:16/06:19:01-06:20/06:24/06:29/06:33/06:46-06:47/06:49-06:50/06:68/ 06:70-06:81/06:83-06:84:01:02/06:95-06:97/06:106-06:107/06:109/06:111-06:117/06:119/06:122-06:125/ 06:127/06:130-06:131/06:136-06:138/06:146:01-06:147/06:150/06:152/06:159/06:161/06:163/06:166/ 06:173/06:175-06:176/06:178-06:179N/06:182-06:183/06:188/06:192/06:197-06:198/06:200-06:201/ 06:206:01-06:206:02/06:208:01-06:208:02/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232/ 06:235-06:237/06:240/06:242/06:249/06:255-06:256/06:262/06:264/06:270:01-06:271/06:273/06:284/ 06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:315/06:317N/ 06:319:02/06:322:01-06:322:03/06:324/06:326/06:333/06:335/06:337-06:338/06:341N/06:344/06:347/ 06:354-06:357/06:363-06:364/06:366/06:370/06:372/06:374/06:376/06:379N-06:380/06:384/06:386/ 06:388/06:390/06:395/06:397N/06:401-06:402/06:404-06:406/06:408-06:409/06:411-06:413/ 06:416:01:01Q-06:416:01:02Q/06:422N/06:430-06:431/06:436-06:438/06:442/06:445-06:448/06:451/ 06:457/06:461/06:468/06:476-06:477N/06:483/06:486-06:487/06:491N/06:493/06:497/06:499/06:503/ 06:512/06:515/06:517/06:524	-, DQ6(1), DQ1, Null	165 bp
						DQB1*03:23:01, DQB1*05:43:02, DQB1*06:02:01:01-06:02:02/06:02:04/06:02:06-06:02:09/06:02:12- 06:02:13/06:02:15/06:02:17-06:02:18/06:02:20-06:02:42/06:02:44-06:02:57/06:02:59-06:03:03/06:03:05w/ 06:03:06-06:03:07/06:03:11-06:03:12/06:03:15/06:03:17-06:03:25/06:03:27-06:03:29/06:03:31-06:03:32/ 06:03:35-06:03:38/06:03:40-06:03:53/06:07:01/06:11:01:01-06:11:03/06:14:01-06:14:02/06:15:01-06:16/ 06:19:02-06:20/06:23-06:24/06:26N/06:28/06:30-06:32:01/06:33/06:37/06:40-06:41:01:03/06:44/06:46- 06:50/06:51:02/06:60-06:62/06:65w/06:67-06:68/06:70-06:74/06:76-06:79:01/06:80-06:84:01:02/06:87/ 06:90/06:92:02/06:95/06:96:02/06:107/06:109-06:113/06:115-06:118:01/06:118:03/06:122/06:124/ 06:126-06:128/06:131/06:133-06:134/06:137/06:141/06:143-06:144N/06:146:01-06:148/06:151/06:154/ 06:156/06:159/06:161-06:163/06:165/06:169/06:173-06:176/06:178-06:179N/06:183-06:185/06:187- 06:188/06:191-06:192/06:195/06:197-06:201/06:203/06:210-06:211/06:213/06:216N/06:218-06:219/ 06:221/06:223-06:228/06:230/06:232-06:238/06:240/06:244/06:248-06:250/06:253/06:255-06:256/ 06:262/06:269-06:273/06:276/06:278-06:279/06:284/06:286/06:289-06:290/06:293-06:298/06:300/ 06:304N/06:306N/06:308N/06:311/06:314-06:317N/06:322:03/06:324/06:326-06:329/06:333-06:336/ 06:338/06:340-06:341N/06:344-06:347/06:350/06:352/06:354-06:357/06:360/06:362-06:367/06:370/ 06:372-06:373/06:376/06:378-06:380/06:383N-06:386/06:388/06:390-06:397N/06:399-06:406/06:409- 06:413/06:416:01:01Q-06:416:01:02Q/06:422N-06:425/06:428/06:430-06:431/06:433/06:436-06:438/ 06:440/06:442-06:443/06:445-06:446/06:448/06:450-06:451/06:453-06:454N/06:456N-06:457/06:459- 06:461/06:468/06:470/06:474/06:476/06:478/06:480-06:481/06:485-06:488/06:491N/06:495/06:497/ 06:499-06:500/06:502-06:504/06:510/06:512/06:515/06:517-06:518/06:521-06:522/06:525	-, DQ6(1), DQ1, Null	65 bp

Position						Mix	Allele	Serology	Size
							DQB1*06:02:01:01-06:02:02/06:02:04/06:02:06-06:02:07/06:02:09/06:02:11-06:02:13/06:02:15/06:02:17-06:02:18/06:02:20-06:02:57/06:02:59-06:03:03/06:03:05w/06:03:06-06:03:07/06:03:11-06:03:13/06:03:15/06:03:17-06:03:25/06:03:27-06:03:29/06:03:31-06:03:33/06:03:35-06:03:53/06:08:01:01-06:08:01:02/06:10-06:11:03/06:13:01/06:14:01-06:14:02/06:16/06:19:02-06:20/06:23-06:24/06:26N/06:28-06:31/06:33/06:40-06:41:01:03/06:44/06:46-06:47/06:49-06:50/06:60-06:63/06:65w/06:67-06:68/06:70-06:79:01/06:80-06:84:01:02/06:87/06:90/06:92:02/06:95-06:96:02/06:106-06:107/06:109-06:113/06:115-06:117/06:122/06:124-06:128/06:130-06:131/06:133-06:134/06:136-06:137/06:141/06:143-06:144N/06:146:01-06:148/06:151/06:154/06:156/06:159/06:161-06:163/06:165-06:166/06:169-06:170/06:173-06:176/06:178-06:179N/06:182-06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:201/06:203/06:206:01/06:210-06:211/06:213/06:216N/06:218-06:219/06:221-06:228/06:230/06:232-06:238/06:240/06:244/06:248-06:250/06:253/06:255-06:256/06:262/06:264/06:269-06:273/06:276/06:278-06:279/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:317N/06:322:01/06:322:03/06:324/06:326-06:329/06:333-06:336/06:338/06:340-06:341N/06:344-06:347/06:350/06:352/06:354-06:357/06:360/06:362-06:367/06:370/06:372-06:374/06:376/06:378-06:380/06:383N-06:386/06:388-06:397N/06:399-06:406/06:408-06:413/06:416:01:01Q-06:416:01:02Q/06:422N-06:425/06:428/06:430-06:431/06:433/06:436-06:438/06:440/06:442-06:443/06:445-06:446/06:448/06:450-06:451/06:453-06:457/06:459-06:461/06:468/06:470/06:474/06:476-06:478/06:480-06:481/06:483/06:485-06:488/06:491N/06:493/06:495/06:497/06:499-06:500/06:502-06:504/06:510/06:512/06:514-06:515/06:517-06:518/06:521-06:522/06:524-06:525	DQ6(1), -, DQ1, Null	105 bp
E1	E3	E5	E7	E9	E11	Mix 4	DQB1*03:500:02, DQB1*06:04:01:01-06:07:02/06:09:01:01-06:09:03/06:09:05/06:09:06w/06:09:07-06:09:13/06:18:01-06:18:02/06:22:02/06:25/06:27:01-06:27:02/06:32:01-06:32:02/06:34/06:36/06:38-06:39/06:52/06:58/06:66/06:69:01/06:85-06:86/06:88:01:01-06:89/06:93-06:94/06:118:01-06:118:02/06:118:04/06:121w/06:129/06:135/06:142/06:155/06:158N/06:160/06:164/06:168/06:171-06:172/06:180/06:186/06:189/06:193N/06:202/06:204/06:207/06:212w/06:217/06:241/06:252N/06:254/06:261/06:265-06:267/06:280-06:283/06:287-06:288/06:291-06:292/06:299/06:303N/06:313/06:320/06:339/06:343/06:348-06:349/06:351/06:353/06:358/06:361/06:368-06:369/06:375/06:381/06:387/06:398/06:407/06:414N/06:420/06:426/06:429/06:432/06:434/06:439Q/06:444/06:449/06:452N/06:458N/06:465/06:467/06:473/06:479/06:484/06:489-06:490/06:494/06:496/06:498/06:505-06:506/06:508/06:511/06:519-06:520/06:523	-, DQ6(1), Null	170 bp
D1	D3	D5	D7	D9	D11	Mix 5	DQB1*02:01:01:01-02:01:09/02:01:11-02:01:13/02:01:15-02:01:23/02:01:24w/02:01:25-02:02:30/02:02:31w/02:03:02-02:24/02:26-02:34/02:36/02:37w/02:38-02:39/02:41-02:45/02:46w-02:47w/02:48-02:71/02:73-02:89/02:02:90w/02:91-02:146/02:148-02:217/02:218?/02:219/02:220?/02:221N-02:233/02:234?/02:235-02:245	DQ2, -, Null	200 bp

Position						Mix	Allele	Serology	Size
C1	C3	C5	C7	C9	C11	Mix 6	DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:68/03:04:01:01-03:04:04/03:09-03:10:03/03:13-03:14:02/03:16/03:19:01:01-03:19:06/03:21-03:23:02/03:24/03:27-03:29/03:35/03:36w/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75-03:77/03:80/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:121/03:122w/03:127-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:151w/03:152/03:154/03:157-03:160/03:162-03:167/03:169-03:170/03:171w/03:172-03:173/03:180/03:182-03:183/03:186-03:188/03:191-03:198:02/03:201-03:202/03:206-03:208/03:216-03:217:01/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:318/03:326-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:353-03:355/03:358N/03:360-03:361:02/03:366/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:399N-03:401/03:404/03:407N-03:408/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:438-03:439/03:443/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:476/03:480Q/03:482-03:483/03:485-03:486/03:488:01N-03:488:02N/03:491-03:492/03:496-03:497/03:499N/03:503/03:506:01:01-03:506:01:02/03:508/03:513-03:514/03:519-03:520/03:522?/03:524/03:526-03:531/03:534/03:537-03:539/03:542N/03:544/03:546/03:549-03:550/03:552-03:553/03:555-03:557/03:562-03:565/03:569/03:571-03:572, DQB1*04:10, DQB1*05:03:02?, DQB1*06:35/06:53:01-06:53:02/06:475	DQ7(3), -, Null, DQ5(1)	see below
							DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:37/03:01:39-03:01:68/03:04:01:01-03:04:01:02/03:04:03-03:04:04/03:09/03:13/03:16/03:19:01:01-03:19:06/03:21-03:22:02/03:24/03:27-03:29/03:35/03:36w/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75/03:77/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:120/03:122w/03:127/03:129-03:130/03:133-03:135/03:140/03:142-03:144/03:147/03:150/03:151w/03:152/03:154/03:157-03:160/03:162-03:165/03:167/03:169-03:170/03:171w/03:172-03:173/03:182/03:186-03:188/03:191-03:194/03:196-03:198:02/03:201-03:202/03:206-03:208/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:254/03:256/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:318/03:326/03:328-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:354N-03:355/03:358N/03:360-03:361:02/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:399N-03:401/03:404/03:407N-03:408/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:439/03:443/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:473N/03:476/03:480Q/03:482-03:483/03:485-03:486/03:488:01N-03:488:02N/03:491-03:492/03:496-03:497/03:499N/03:503/03:506:01:01-03:506:01:02/03:508/03:513-03:514/03:519-03:520/03:522?/03:524/03:526-03:531/03:534/03:537-03:539/03:542N/03:544/03:546/03:549-03:550/03:552-03:553/03:555-03:557/03:562-03:565/03:569/03:571-03:572, DQB1*06:35/06:53:01-06:53:02/06:475	DQ7(3), -, Null	100 bp

Position						Mix	Allele	Serology	Size
							DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:68/03:04:01:01-03:04:04/03:09-03:10:03/03:13-03:14:02/03:16/03:19:01:01-03:19:06/03:21-03:22:02/03:24/03:27-03:29/03:35/03:36w/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75-03:77/03:80/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:121/03:122w/03:127-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:151w/03:152/03:154/03:157-03:160/03:162-03:167/03:169-03:170/03:171w/03:172-03:173/03:180/03:182-03:183/03:186-03:188/03:191-03:198:02/03:201-03:202/03:206-03:207/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:318/03:326-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:353-03:355/03:358N/03:360-03:361:02/03:366/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:400N-03:401/03:404/03:407N-03:408/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:438-03:439/03:443/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:476/03:480Q/03:482-03:483/03:485-03:486/03:488:01N-03:488:02N/03:491-03:492/03:496-03:497/03:499N/03:503/03:506:01:01-03:506:01:02/03:508/03:513-03:514/03:519-03:520/03:522?/03:524/03:526-03:531/03:534/03:537-03:539/03:542N/03:544/03:546/03:549-03:550/03:553/03:555-03:557/03:562-03:565/03:569/03:571-03:572	DQ7(3), -, Null	215 bp
							DQB1*03:23:01-03:23:02/03:217:01/03:355, DQB1*04:10, DQB1*05:03:02?	-, DQ5(1)	120 bp
B1	B3	B5	B7	B9	B11	Mix 7	DQB1*03:04:01:01-03:04:04/03:14:01-03:14:02/03:70/03:80/03:179w/03:318/03:327/03:443/03:474w/03:549, DQB1*06:246w	DQ7(3), -	175 bp
A1	A3	A5	A7	A9	A11	Mix 8	DQB1*03:02:01:01-03:02:09/03:02:11-03:02:15/03:02:16w/03:02:17-03:02:47/03:07-03:08/03:11/03:32/03:37/03:45:01-03:45:02/03:62-03:64/03:66N-03:68/03:70/03:81/03:85/03:106-03:107/03:125/03:146/03:153/03:161/03:174-03:175/03:178-03:179/03:184-03:185/03:189-03:190/03:199/03:203-03:205/03:210-03:211/03:213N-03:215/03:220-03:221/03:223-03:224/03:225w/03:228-03:229/03:233/03:237N/03:240/03:245/03:247/03:251/03:261/03:263:01:01-03:263:01:02/03:265/03:269N/03:273-03:274/03:277-03:279/03:287/03:289/03:295-03:296/03:298-03:301/03:308/03:310N/03:315/03:320-03:324/03:333-03:334N/03:339N/03:343-03:345/03:348-03:349/03:352/03:362/03:364/03:367-03:369/03:371/03:379/03:383/03:386/03:388/03:392/03:403N/03:409-03:410/03:412-03:413/03:415-03:416/03:422N/03:429/03:433/03:437w/03:440N-03:442/03:444/03:446-03:447/03:450/03:452/03:456-03:457/03:459/03:462-03:464/03:466/03:471/03:479/03:481/03:484/03:490/03:493/03:495/03:498/03:500:01/03:501-03:502/03:504/03:511-03:512/03:515/03:517/03:525/03:533/03:535/03:540-03:541N/03:543/03:547-03:548/03:554/03:558-03:559/03:561/03:566-03:567/03:570, DQB1*06:29/06:123/06:139/06:246/06:337/06:524	DQ8(3), -, Null	130 bp
H2	H4	H6	H8	H10	H12	Mix 9 +	DQB1*03:02:01:01-03:02:01:10/03:02:01:12-03:02:03/03:02:09/03:02:12/03:02:21-03:02:24/03:02:32-03:02:33/03:02:36-03:02:37/03:02:39-03:02:40/03:02:42-03:02:47/03:05:01/03:05:03-03:05:04/03:08/03:11/03:37/03:68/03:211/03:229/03:245/03:247/03:250-03:251/03:263:01:01-03:263:01:02/03:289/03:415-03:416/03:422N/03:429/03:442/03:464/03:481/03:484/03:493/03:498/03:500:01/03:501-03:502/03:504/03:533/03:535/03:540-03:541N/03:543/03:547-03:548/03:554/03:558-03:559/03:561	DQ8(3), -, Null	190 bp

Position						Mix	Allele	Serology	Size
G2	G4	G6	G8	G10	G12	Mix 10	DQB1*02:77/02:180:01-02:180:02, DQB1*03:03:02:01-03:03:05/03:03:06w/03:03:07-03:03:16/03:03:17w/03:03:18-03:03:25/03:03:27-03:03:29/03:03:30?/03:03:31-03:03:34/03:06w/03:12/03:15/03:20/03:23:03/03:25:01w-03:25:02w/03:26/03:30-03:31/03:33-03:34/03:38:01-03:41/03:43/03:65/03:74/03:79/03:86-03:91Q/03:95N-03:99Q/03:104-03:105/03:111-03:113/03:117/03:123-03:124/03:126w/03:136-03:137/03:141/03:145w/03:155-03:156/03:168/03:176-03:177/03:200/03:209/03:212/03:217:02/03:222/03:227/03:230/03:234/03:238-03:239/03:248-03:249/03:258/03:270/03:280/03:282N-03:283/03:304/03:313/03:316/03:319/03:332/03:336-03:337/03:351/03:356N-03:357N/03:359/03:363/03:365/03:374-03:375N/03:382:01-03:382:02/03:384/03:393/03:395/03:397-03:398/03:402/03:405-03:406/03:411N/03:414/03:445/03:453/03:461/03:477-03:478/03:487/03:489/03:494/03:505/03:507/03:509N-03:510/03:516/03:518/03:521/03:523w/03:532/03:536/03:545/03:551N/03:560N/03:568, DQB1*04:03:01w-04:03:03w, DQB1*06:02:43/06:03:10/06:03:33/06:51:01/06:66/06:96:01/06:118:04/06:168/06:172/06:322:01-06:322:02/06:377	-, DQ9(3), DQ3, Null	135 bp
F2	F4	F6	F8	F10	F12	Mix 11 †	DQB1*03:02:01:11/03:03:02:01-03:03:04/03:03:11/03:03:30/03:03:33-03:03:34/03:25:01/03:30-03:31/03:105/03:126/03:195/03:217:02/03:239/03:248-03:249/03:414/03:445/03:453/03:478/03:505/03:507/03:536/03:545/03:551N/03:560N/03:568	-, DQ9(3), Null	175 bp

Position						Mix	Allele	Serology	Size
E2	E4	E6	E8	E10	E12	Mix 12	DQB1*02:57?/02:77?/02:141?, DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:05/03:01:06w/ 03:01:07-03:01:52/03:01:54-03:02:22/03:02:24-03:02:43/03:02:44?/03:02:45-03:03:33/03:03:34w/ 03:04:01:01-03:05:05/03:07-03:22:02/03:23:02-03:24/03:25:02-03:128/03:130-03:131/03:133-03:324/ 03:326-03:487/03:488:01N?-03:488:02N?/03:489-03:512/03:513?/03:514-03:540/03:542N-03:550/ 03:552?/03:553-03:572, DQB1*05:11:01/05:131?/05:240, DQB1*06:02:02/06:03:02/06:03:34/06:04:08/ 06:09:07/06:29?/06:63/06:66/06:87/06:96:01?-06:96:02?/06:139/06:145:02/06:172/06:208:02/06:209?/ 06:320?/06:322:01-06:322:03/06:337/06:475	-, DQ7(3), Null, DQ8(3), DQ9(3), DQ6(1)	see below
							DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:01:73/03:01:03-03:01:05/03:01:06w/03:01:07-03:01:29/ 03:01:31-03:01:52/03:01:54-03:02:02:02/03:02:05-03:02:12/03:02:14-03:02:22/03:02:24-03:02:43/ 03:02:44?/03:02:45-03:03:02:20Q/03:03:04-03:03:33/03:03:34w/03:04:01:01-03:04:04/03:05:03-03:05:04/ 03:07-03:17:01/03:18-03:19:06/03:21-03:22:02/03:23:02-03:24/03:25:02-03:36/03:38:01/03:39-03:43/ 03:45:01-03:53/03:55-03:60/03:62-03:71/03:74/03:76-03:98/03:101-03:111/03:113-03:117/03:119-03:128/ 03:130-03:131/03:133-03:135/03:137-03:155/03:157-03:161/03:163-03:174/03:176-03:180/03:182/ 03:184-03:203/03:205-03:222/03:224-03:225/03:227-03:232/03:234-03:236/03:239-03:249/03:251/ 03:253-03:261/03:263:01:01-03:268/03:270-03:290/03:292-03:324/03:326-03:335/03:337-03:345/03:347- 03:350/03:353/03:355-03:370/03:372-03:373/03:375N-03:390/03:392-03:440N/03:442-03:487/ 03:488:01N?-03:488:02N?/03:489-03:512/03:513?/03:514-03:515/03:517-03:540/03:542N-03:550/ 03:552?/03:553-03:571, DQB1*05:11:01/05:240, DQB1*06:02:02/06:03:02/06:03:34/06:04:08/06:09:07/ 06:145:02/06:208:02	DQ7(3), -, Null, DQ8(3), DQ9(3), DQ6(1)	160 bp
							DQB1*02:57?/02:77?/02:141?, DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:05/03:01:06w/03:01:07- 03:01:36/03:01:38-03:01:52/03:01:54-03:02:22/03:02:24-03:02:41/03:02:43/03:02:44?/03:02:45-03:03:33/ 03:03:34w/03:04:01:01-03:05:05/03:07-03:15/03:17:01-03:22:02/03:24/03:26-03:128/03:130-03:131/ 03:133-03:171/03:173-03:213N/03:215-03:216/03:218-03:233/03:235-03:258/03:260/03:262-03:281/ 03:283-03:324/03:326-03:354N/03:356N-03:449/03:451-03:487/03:488:01N?-03:488:02N?/03:489-03:512/ 03:513?/03:514-03:523/03:525-03:540/03:542N-03:550/03:552?/03:553-03:572, DQB1*05:131?, DQB1*06:29?/06:63/06:66/06:87/06:96:01?-06:96:02?/06:139/06:172/06:209?/06:320?/06:322:01- 06:322:03/06:337/06:475	-, DQ7(3), Null, DQ8(3), DQ9(3)	110 bp
D2	D4	D6	D8	D10	D12	Mix 13	DQB1*03:132, DQB1*04:01:01:01-04:01:05/04:01:06?/04:01:07-04:02:01:01/04:02:01:04-04:02:01:22/ 04:02:03-04:02:07/04:02:09-04:02:21/04:02:23?/04:02:24-04:03:01/04:04-04:30/04:32-04:47/04:49-04:66/ 04:67w/04:68N-04:90/04:91?/04:92-04:104	-, DQ4, Null	210 bp
C2	C4	C6	C8	C10	C12	Mix 14	Negative Control		440 bp

Amplification control (internal positive control): 440 base pairs (bp)

Positions: B2-A2, B4-A4, B6-A6, B8-A8, B10-A10 and B12-A12 are empty wells.

w = weak **?** = nucleotide sequence information not available for the primer matching sequence or alleles with unknown reactivities

Bold: mixes which result in PCR fragments of different sizes (the specificities are first indicated all in one row, then split into several groups in the subsequent rows depending on the fragment size)

Mix 6, HLA-DQB1*03:10: a rare allele according to Mack SJ et al., Tissue Antigens 2013, serological equivalent is controversially discussed (DQ3, DQ7 or DQ8).

† **ATTENTION!** Alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2025) have been excluded from the list of allele specificities of these mixes.

Table 2: Amplification patterns for all **HLA-DQB1*** alleles detected by the HLA-DQB1* CTS-PCR-SSP reagents (**Lot-No DQB14-2**) based on IMGT/HLA Sequence Database Release 3.59.0, January 2025

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*02:01:01:01-02:01:09/02:01:11-02:01:13/02:01:15-02:01:23/02:01:25-02:02:30/02:03:02-02:24/02:26-02:34/02:36/02:38-02:39/02:41-02:45/02:48-02:56/02:58N-02:71/02:73-02:76/02:78-02:89/02:91-02:140/02:142:01:01-02:146/02:148-02:179/02:181-02:217/02:219/02:221N-02:233/02:235-02:245	DQ2, -, Null					5								
DQB1*02:01:24/02:02:31/02:37/02:46-02:47/02:90	-					w								
DQB1*02:57/02:141	-					5							?	
DQB1*02:77	-					5					10		?	
DQB1*02:180:01-02:180:02	-					5					10			
DQB1*02:218/02:220/02:234	-					?								
DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:05/03:01:07-03:01:52/03:01:54-03:01:68/03:09-03:10:03/03:13/03:16/03:19:01:01-03:19:06/03:21-03:22:02/03:24/03:27-03:29/03:35/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75-03:77/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:121/03:127-03:128/03:130-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:152/03:154/03:157-03:160/03:162-03:167/03:169-03:170/03:172-03:173/03:180/03:182-03:183/03:186-03:188/03:191-03:193/03:196-03:198:02/03:201-03:202/03:206-03:208/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:317:02/03:326/03:328-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:353-03:355/03:358N/03:360-03:361:02/03:366/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:399N-03:401/03:404/03:407N/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:438-03:439/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:473N/03:475-03:476/03:480Q/03:482-03:483/03:485-03:486/03:491-03:492/03:496-03:497/03:499N/03:503/03:506:01:01-03:506:01:02/03:508/03:514/03:519-03:520/03:524/03:526-03:531/03:534/03:537-03:539/03:542N/03:544/03:546/03:550/03:553/03:555-03:557/03:562-03:565/03:569/03:571-03:572	DQ7(3), -, Null, DQ8(3)						6						12	
DQB1*03:01:06	-						6						w	
DQB1*03:01:53/03:129	-						6							
DQB1*03:02:01:01-03:02:01:10/03:02:01:12-03:02:03/03:02:09/03:02:12/03:02:21-03:02:22/03:02:24/03:02:32-03:02:33/03:02:36-03:02:37/03:02:39-03:02:40/03:02:42-03:02:43/03:02:45-03:02:47/03:11/03:37/03:68/03:211/03:229/03:245/03:247/03:251/03:263:01:01-03:263:01:02/03:289/03:415-03:416/03:422N/03:429/03:442/03:464/03:481/03:484/03:493/03:498/03:500:01/03:501-03:502/03:504/03:533/03:535/03:540/03:543/03:547-03:548/03:554/03:558-03:559/03:561	DQ8(3), -, Null								8	9			12	
DQB1*03:02:01:11	-								8			11	12	

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*03:02:04-03:02:08/03:02:11/03:02:13-03:02:15/03:02:17-03:02:20/03:02:25-03:02:31/ 03:02:34-03:02:35/03:02:38/03:02:41/03:07/03:32/03:45:01-03:45:02/03:62-03:64/03:66N-03:67/ 03:81/03:85/03:106-03:107/03:125/03:146/03:153/03:161/03:174-03:175/03:178/03:184-03:185/ 03:189-03:190/03:199/03:203-03:205/03:210/03:213N-03:215/03:220-03:221/03:223-03:224/03:233/ 03:237N/03:240/03:261/03:265/03:269N/03:273-03:274/03:277-03:279/03:287/03:295-03:296/ 03:298-03:301/03:308/03:310N/03:315/03:320-03:324/03:333-03:334N/03:339N/03:343-03:345/ 03:348-03:349/03:352/03:362/03:364/03:367-03:369/03:371/03:379/03:383/03:386/03:388/03:392/ 03:403N/03:409-03:410/03:412-03:413/03:433/03:440N-03:441/03:444/03:446-03:447/03:450/ 03:452/03:456-03:457/03:459/03:462-03:463/03:466/03:471/03:479/03:490/03:495/03:511-03:512/ 03:515/03:517/03:525/03:566-03:567/03:570, DQB1*06:139	DQ8(3), -, Null								8				12	
DQB1*03:02:10/03:03:26/03:05:02/03:05:05/03:17:01-03:18/03:61/03:72/03:78/03:100/03:110/ 03:148-03:149/03:181/03:226/03:244/03:259/03:262/03:272/03:314/03:346	-, DQ8(3)												12	
DQB1*03:02:16/03:225/03:437	-								w				12	
DQB1*03:02:23/03:541N	-, Null								8	9				
DQB1*03:02:44	-								8	9			?	
DQB1*03:03:02:01-03:03:04/03:03:11/03:03:33/03:30-03:31/03:105/03:217:02/03:239/03:248- 03:249/03:414/03:445/03:453/03:478/03:505/03:507/03:536/03:545/03:560N/03:568	DQ9(3), -, Null										10	11	12	
DQB1*03:03:05/03:03:07-03:03:10/03:03:12-03:03:16/03:03:18-03:03:25/03:03:27-03:03:29/ 03:03:31-03:03:32/03:12/03:15/03:20/03:23:03/03:26/03:33-03:34/03:38:01-03:41/03:43/03:65/ 03:74/03:79/03:86-03:91Q/03:95N-03:99Q/03:104/03:111-03:113/03:117/03:123-03:124/03:136/ 03:141/03:155-03:156/03:168/03:176-03:177/03:200/03:209/03:212/03:222/03:227/03:230/03:234/ 03:238/03:258/03:270/03:280/03:282N-03:283/03:304/03:313/03:316/03:319/03:332/03:336- 03:337/03:351/03:356N-03:357N/03:359/03:363/03:365/03:374-03:375N/03:382:01-03:382:02/ 03:384/03:393/03:395/03:397-03:398/03:402/03:405-03:406/03:411N/03:461/03:477/03:487/ 03:489/03:494/03:509N-03:510/03:516/03:518/03:521/03:532	-, Null										10		12	
DQB1*03:03:06/03:03:17/03:25:02/03:145/03:523	-										w		12	
DQB1*03:03:30	-										?	11	12	
DQB1*03:03:34	-										10	11	w	
DQB1*03:04:01:01-03:04:04/03:14:01-03:14:02/03:80/03:318/03:327/03:443/03:549	DQ7(3), -						6	7					12	
DQB1*03:05:01/03:05:03-03:05:04/03:250	DQ8(3), -									9			12	
DQB1*03:06, DQB1*04:03:02-04:03:03	DQ3, -										w			
DQB1*03:08	-			3					8	9			12	
DQB1*03:23:01	-			3			6							
DQB1*03:23:02/03:217:01	-			3			6						12	
DQB1*03:25:01	-										w	11		

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*03:36/03:122/03:151/03:171	-						w						12	
DQB1*03:70	-							7	8				12	
DQB1*03:126	-										w	11	12	
DQB1*03:132, DQB1*04:01:01:01-04:01:05/04:01:07-04:02:01:01/04:02:01:04-04:02:01:22/04:02:03-04:02:07/04:02:09-04:02:21/04:02:24-04:02:27/04:04-04:09/04:11-04:30/04:32-04:47/04:49-04:66/04:68N-04:90/04:92-04:104	-, DQ4, Null													13
DQB1*03:137, DQB1*06:322:01-06:322:02	-			3							10		12	
DQB1*03:179	-							w	8				12	
DQB1*03:194/03:408, DQB1*06:475	-		2				6						12	
DQB1*03:195	-						6					11	12	
DQB1*03:228, DQB1*06:337	-			3					8				12	
DQB1*03:474	-						6	w					12	
DQB1*03:488:01N-03:488:02N/03:513/03:552	Null, -						6						?	
DQB1*03:500:02, DQB1*06:04:08/06:09:07	-				4								12	
DQB1*03:522	-						?						12	
DQB1*03:551N	Null										10	11		
DQB1*04:01:06/04:02:23/04:91	-													?
DQB1*04:03:01	-										w			13
DQB1*04:10	-	w					6							13
DQB1*04:67	-													w
DQB1*05:01:01:01-05:01:13/05:01:15/05:01:17-05:01:18/05:01:20-05:03:01:12/05:03:03-05:03:09/05:03:11-05:03:24/05:03:26-05:10/05:11:02-05:20:02/05:22-05:25/05:27-05:33/05:35-05:43:01/05:45-05:59/05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:114-05:115/05:117-05:127/05:129/05:132Q-05:170/05:172-05:174/05:176-05:206N/05:208N-05:217/05:219-05:227/05:229-05:239/05:241-05:257/05:259-05:299/05:301/05:303-05:343/05:345-05:349/05:351-05:357, DQB1*06:325	DQ5(1), -, Null	1												
DQB1*05:01:16/05:01:19/05:03:25/05:26/05:34/05:44/05:113/05:128N/05:130/05:171/05:228/05:302	-, Null	w												
DQB1*05:03:02	DQ5(1)	1					?							
DQB1*05:11:01/05:240	-	1											12	
DQB1*05:43:02, DQB1*06:23/06:156/06:162/06:169	-	1		3										
DQB1*05:131	-	1											?	
DQB1*05:344, DQB1*06:149/06:257	-		w											

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*05:350	-	?												
DQB1*06:01:01:01-06:01:29/06:01:31-06:01:36/06:03:04/06:03:08-06:03:09/06:03:14/06:03:16/ 06:03:26/06:03:30/06:08:02-06:08:03/06:11:04-06:12/06:14:03/06:17/06:21/06:42-06:43/06:45/ 06:54N-06:57:02/06:59/06:64/06:91/06:98-06:105/06:108/06:120/06:132/06:140/06:145:01/06:157/ 06:177/06:181/06:190:01-06:190:02/06:194/06:196/06:205/06:214/06:229/06:239/06:243/06:245/ 06:251/06:258-06:259/06:263/06:268/06:274-06:275/06:277/06:285/06:302/06:305/06:307/06:309- 06:310/06:312/06:319:01/06:321/06:323/06:330N-06:331/06:359/06:371/06:382/06:418-06:419/ 06:421/06:427/06:435/06:462-06:463/06:466/06:469/06:471-06:472/06:482/06:492/06:501/ 06:507N/06:509/06:513/06:516	DQ6(1), -, DQ1, Null		2											
DQB1*06:01:30/06:464	-		?											
DQB1*06:02:01:01-06:02:01:42/06:02:03-06:02:06/06:02:08-06:02:42/06:02:44-06:02:65/06:03:07/ 06:03:19/06:10-06:11:01:02/06:13:01-06:13:03/06:14:02/06:15:01-06:16/06:19:01-06:20/06:24/ 06:33/06:37/06:46-06:50/06:51:02/06:68/06:70-06:81/06:83-06:84:01:02/06:95/06:97/06:106- 06:107/06:109/06:111-06:117/06:118:03/06:119/06:122/06:124-06:127/06:130-06:131/06:136- 06:138/06:146:01-06:147/06:150-06:152/06:159/06:161/06:163/06:166/06:173-06:176/06:178- 06:179N/06:182-06:183/06:188/06:192/06:197-06:198/06:200-06:201/06:206:01-06:206:02/ 06:208:01/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232/06:235-06:237/06:240/ 06:242/06:249/06:255-06:256/06:262/06:264/06:270:01-06:271/06:273/06:284/06:286/06:289- 06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:315/06:317N/ 06:319:02/06:324/06:326/06:333/06:335/06:338/06:341N/06:344/06:347/06:354-06:357/06:363- 06:364/06:366/06:370/06:372/06:374/06:376/06:379N-06:380/06:383N-06:384/06:386/06:388- 06:390/06:393/06:395/06:397N/06:401-06:402/06:404-06:406/06:408-06:409/06:411-06:413/ 06:416:01:01Q-06:416:01:02Q/06:422N/06:430-06:431/06:436-06:438/06:442/06:445-06:448/ 06:451/06:456N-06:457/06:461/06:468/06:476-06:477N/06:483/06:485-06:487/06:491N/06:493/ 06:497/06:499/06:503/06:512/06:515/06:517	DQ6(1), -, DQ1, Null			3										
DQB1*06:02:02/06:208:02/06:322:03	DQ6(1), -			3									12	
DQB1*06:02:07/06:03:01:01-06:03:01:26/06:03:03/06:03:06/06:03:11-06:03:13/06:03:15/06:03:17- 06:03:18/06:03:20-06:03:25/06:03:27-06:03:29/06:03:31-06:03:32/06:03:35-06:03:53/06:08:01:01- 06:08:01:02/06:11:02-06:11:03/06:14:01/06:26N/06:28/06:30-06:31/06:40-06:41:01:03/06:44/06:60- 06:62/06:67/06:82/06:90/06:92:02/06:110/06:128/06:133-06:134/06:141/06:143-06:144N/06:148/ 06:154/06:165/06:170/06:184-06:185/06:187/06:191/06:195/06:199/06:203/06:210/06:218/06:221- 06:223/06:230/06:233-06:234/06:238/06:244/06:248/06:250/06:253/06:269/06:272/06:278-06:279/ 06:316/06:327-06:329/06:334/06:336/06:340/06:345N-06:346/06:350/06:352/06:360/06:362/ 06:365/06:367/06:373/06:378/06:385/06:391-06:392/06:394N/06:396/06:400/06:403/06:410/ 06:423N-06:425/06:428/06:433/06:440/06:443/06:450/06:453-06:455/06:459-06:460/06:470/ 06:474/06:478/06:480-06:481/06:488/06:495/06:500/06:502/06:504/06:510/06:514/06:518/06:521- 06:522/06:525	-, DQ6(1), DQ1, Null		2	3										
DQB1*06:02:43	-			3							10			

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*06:03:02/06:63/06:87	DQ6(1), -		2	3									12	
DQB1*06:03:05/06:65	-		2	w										
DQB1*06:03:10	-		2								10			
DQB1*06:03:33	-		2	3							10			
DQB1*06:03:34/06:145:02	-		2										12	
DQB1*06:04:01:01-06:04:07/06:04:09-06:06/06:07:02/06:09:01:01-06:09:03/06:09:05/06:09:08-06:09:13/06:18:01-06:18:02/06:22:02/06:25/06:27:01-06:27:02/06:32:02/06:34/06:36/06:38-06:39/06:52/06:58/06:69:01/06:85-06:86/06:88:01:01-06:89/06:93-06:94/06:118:02/06:129/06:135/06:155/06:158N/06:160/06:164/06:171/06:180/06:186/06:189/06:193N/06:202/06:204/06:207/06:217/06:241/06:252N/06:254/06:261/06:265-06:267/06:280-06:283/06:287-06:288/06:291-06:292/06:299/06:303N/06:313/06:339/06:343/06:348-06:349/06:351/06:353/06:358/06:361/06:368-06:369/06:375/06:381/06:387/06:398/06:407/06:414N/06:420/06:426/06:429/06:432/06:434/06:439Q/06:444/06:449/06:452N/06:458N/06:465/06:467/06:473/06:479/06:489-06:490/06:494/06:496/06:498/06:505-06:506/06:508/06:511/06:519-06:520/06:523	DQ6(1), -, Null				4									
DQB1*06:07:01/06:32:01/06:118:01	-			3	4									
DQB1*06:09:06/06:121/06:212	-				w									
DQB1*06:29	-			3					8				?	
DQB1*06:35/06:53:01-06:53:02	-		2				6							
DQB1*06:51:01/06:377	-										10			
DQB1*06:66/06:172	-				4						10		12	
DQB1*06:96:01	-			3							10		?	
DQB1*06:96:02	-			3									?	
DQB1*06:118:04	-				4						10			
DQB1*06:123/06:524	-			3					8					
DQB1*06:142/06:484	-		2		4									
DQB1*06:168	-		2		4						10			
DQB1*06:209	-		2										?	
DQB1*06:246	-		2					w	8					
DQB1*06:276	-		w	3										
DQB1*06:320	-				4								?	
DQB1*06:399	-		?	3										

w = weak

? = nucleotide sequence information not available for the primer matching sequence or alleles with unknown reactivities

ATTENTION! Alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2025) have been excluded from the list of allele specificities of these mixes.

14. Certificate of Analysis



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CTS Collaborative Transplant Study

Certificate of Analysis

HLA-DQB1* CTS-PCR-SSP Tray Kit

Product number	119
Lot number	DQB14-2
Number of HLA-specific primer mixes per test	13

Mix specifications

The specificity of each primer pair has been tested against a panel of well characterized DNAs.

Result

No false positive or false negative amplifications were obtained under our test conditions of the bulk reagents.

Date of approval	28.07.2025
Approved by	H. Tran, M.D. Quality Control, Supervisor